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# Western Forest

## Insect News

(Not for Publication)

An Informal Letter  
of  
U.S. DEPARTMENT OF AGRICULTURE  
BUREAU OF ENTOMOLOGY  
Forest Insect Investigations

P. O. Box 3010, Stanford University, Calif., March 1, 1927

### ANOTHER BLACK HILLS BEETLE EPIDEMIC?

By  
H.L. Person

The Black Hills beetle apparently has a thirst for publicity which it satisfies with an occasional outburst of sensational proportions. It is not contented to plug along like the more humble, but in the long run just as destructive, western pine beetle, which is satisfied with an annual toll of from a fraction of one percent to 3 or 4 percent of the stand. When D. ponderosae "feels the urge" it gets busy and in the course of a few years kills 50 percent or more of an entire forest, before it again settles down to the quiet life. The outbreak in the Black Hills between 1897 and 1908 and the recent epidemic on the Kaibab plateau are the two outstanding examples of the tree killing ability of this insect. One hears so much of these two "killings" and so little of this beetle between outbreaks that a Black Hills beetle infestation has almost come to mean the sudden and more or less complete ravaging of an entire forest by a horde of beetles which seem to come from nowhere, making one almost wonder if spontaneous generation is not a fact instead of a fallacy.

With such a picture in mind I started the examination of the Colorado National Forest in December of last year. I soon found that I had expected too much of the beetle. It was like catching a magician in the middle of his preparations for a trick, with the method and mechanism all exposed. It made me realize that although the Black Hills beetle is one of our worst tree killing insects there is nothing uncanny or unreasonable about its rate of increase. A 1000 percent increase in beetles between attack and emergence is a common occurrence and figuring a 50 percent mortality during flight and attack we could still expect an increase of 500 percent in one generation. The examination made on the Colorado N.F. showed that the 1926-27 infestation is 5 times as great as the 1925-26 infestation. The present overwintering loss of 200 trees per section is not much of an epidemic for D. ponderosae but if the same rate of increase continued the loss for 1927-28 would be 1000 trees per section and anyone can see that it wouldn't take many years before we would have a real epidemic.

The epidemic on the Kaibab was the most sudden and destructive manifestation of this beetle of which we have any very complete record and yet an increase of 500 percent for 3 or 4 consecutive years would account for the infestation at its peak. Keen, who studied the infestation for two years, believes that starting with a loss of 40 trees per section in 1920 a 300 percent increase for three years would account for the total loss found on the area in 1923. And even to one accustomed to western pine beetle infestations this is not an unbelievable rate of increase. In my limited experience I have found two cases in which a D. brevicornis infestation has increased at a greater rate, the only for one year. In 1922 the infestation on a check area of the California N.F. increased 700 percent over the 1921 loss (this may have been partly due to the emergence from a windfall area on the same forest) and in 1925 the loss from D. brevicornis on the Cascadel area showed a 340 percent increase over the 1924 loss on the same area.

The phenomenal part of these Black Hills beetle epidemics, then, is not the rate of increase but the fact that this increase is continued until a large percent of the stand is killed. This is accomplished not by taking a uniform percent of the stand over the whole forest at the same time but by concentrating and killing practically 100 percent of the stand on a definite area and then moving onto new areas until the whole forest is devastated or the epidemic is broken.

What is needed is the study of an infestation thru a complete cycle from a low endemic through a high epidemic and back to a low endemic status again. The difficulty is to know when the epidemic is going to occur. One might follow the infestation in a forest for 20 years and never find a real epidemic. A more logical method would be to investigate all reports of a definite increase in infestation and make a study of the most promising looking ones.

The present situation on the Colorado N.F. is one that is well worth studying. The overwintering infestation is about 5 times as great as it was a year ago and if this rate of increase continued there would be 1000 infested trees per section on the yellow pine areas next year, which would make quite a respectable epidemic. This will probably not happen and no one can say whether the infestation will go up or down or remain static. In any case a careful study of the situation should be decidedly worth while.

IS DIRECT CONTROL TOO EXPENSIVE?

In your issue for February 1, I find the statement "The consensus of opinion was that direct control measures except on relatively small areas, were too expensive to be used." This is undoubtedly true where economic values only are considered. In the Parks a beautiful forest is priceless. If control measures cost many times the stumpage value, the expenditure is justified. Considering the great recreational use of our National Forests I am wondering if the time has not arrived when the same yardstick should be used in measuring values. If not it surely will arrive soon.

J.R.Eakin, Supt. Grand Canyon Nat. Park.

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PINE SCALE DEFOLIATION PREVALENT

"It may be inflammatory rheumatism, the scurvy, San Jose scale, or Australian whichitot, but it looks like defoliation to me" wrote Ranger Frank Sweeley of the Sierra recently when he sent in some infested yellow pine and sugar pine foliage to the Palo Alto Station.

"At least three years ago some of the yellow pine took on a scraggly dejected appearance. The foliage thinned out all over the trees affected. The trouble then, and now, flared up in Big Creek particularly in that part of the town allotted to the Edison Company. This first attack was mild compared to the one of today. During the past two months the situation has become serious and we are considerably exercised over the outlook. Dozens of trees are affected and a few trees have died.

1. The attack seems centered in the thrifty mature class, although trees of all ages have been attacked.
2. Attack may start at the top or bottom of the crown, but usually appears all over the tree.
3. Needles die on all the branches. In most cases I estimate that half or over of the foliage is gone.
4. In some cases the attack has affected all the branches. In some instances blue stain has appeared while green needles still remained on the tree.
5. Some trees, very few, have been heavily infested by barkbeetles, but in my opinion these attacks are secondary."

The scales sent in by Mr. Sweeley were found to be Aspidiotus pini, Comstock, and Chionaspis pinifoliae, Fitch. At about the same time material infested by the same species was sent in from the San Bernardino and serious damage reported on recreational areas. During the past season I noted sugar pines in vicinity of Nevada City that had been considerably defoliated by these insects. Apparently the past season was a favorable one for the scales.

This type of infestation threatens to become something of a problem where pine compose the principal forest cover about camp grounds, parks and summer home sites.

J.M.Miller



## CONFERENCE OF WESTERN FOREST ENTOMOLOGISTS.

A conference of western Government workers in forest insect investigations was held at Palo Alto, Calif., February 8-16. Dr. F.C. Craighead, chief of the Branch, attended from Washington; J.C. Evenden from Coeur d'Alene, Idaho; A.J. Jaenicke from Portland, Oreg.; and J.M. Miller, Dr. M.W. Blackman, Dr. H.E. Burke, F.P. Keen, J.E. Patterson and H.L. Person from Palo Alto.

Past work was reviewed and discussed and plans for the coming year considered and approved.

California livened up the conference with the usual unusual weather. Heavy rain storms and one good earthquake were enjoyed by all.

H.E. Burke.

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## RELATION BETWEEN GROWTH AND BEETLE LOSS VOLUMES.

This is perhaps too complicated a relationship to enable generalization in a few words. The average annual beetle loss in a large yellow pine stand in Southern Oregon for the six-year period, epidemic and endemic included, amounted to 0.34 of one percent. The gross annual growth for this same period is estimated by yellow pine growth specialists in this region to have been 0.70 of one percent. In other words, the beetles killed about one-half of the gross volume growth. Other destructive agencies made further inroads on this gross growth so that the net growth didn't amount to very much. On the epidemic areas, where the average annual beetle loss amounted to 1.17 per cent of the stand, the beetles not only wiped out all the gross growth but actually reduced the timber volume as well.

It seems to the writer that whenever a given virgin body of timber is to be completely logged out in 20 to 30 years, the ratio between growth and beetle losses is of little importance, for every tree killed by the beetles means one tree less for the mill. It is manifestly impossible to keep a mature tree alive indefinitely, for eventually some destructive agency or several of them will kill it. However, the protection of a mature stand of timber against beetle epidemics during a limited period of time is a coat of another color. Private timber owners are interested for the most part only in this limited period. As a consequence, the mere fact that beetles are not taking more than the growth is of little interest to them. The loss of the mature trees, the kind most valuable for lumber, and unfortunately the kind preferred by the beetles, is the thing that interests them. It is only when yellow pine areas are being cut on a sustained yield basis, as in a few national forest operations, that the growth volume-beetle loss volume relationship has important significance,

A. J. Jaenicke.

### REVIEWING THE REVIEWER.

In a review of Prof. Essig's very excellent new manual of "Insects of Western North America" given by "H.R.F." in the Journal of Forestry for January 1927, Prof. Essig is taken to task for certain "important omissions", among which are mentioned the Douglas Fir cone moth (Cydia pseudotsugana Kearfott) and Monochamus monticola. "H.R.F." appears to have searched the book very carefully in the attempt to find something to criticise but he didn't look carefully enough or he would have found his Douglas Fir cone moth on Page 728 under it's newest disguise of Zeiraphera diniana (Guenée) which is a synonym for Enarmonia (Cydia) pseudotsugana (Kearfott). As a matter of fact it is very doubtful if Cydia pseudotsugana is the common Douglas fir cone moth of Montana. According to Heinrich (Bul. 123 U.S.N.M., 1923) there are no specimens from that State in the National Collection, the American Museum or the collection of Barnes. Large series of Douglas Fir cone moths reared from Montana material at the Ashland station all proved to be Barbara colfaxiana taxifoliolla (Busck) (also mentioned by Essig) and in no case was Cydia pseudotsugana found.

Monochamus monticola is one of Col. Casey's species and by many coleopterists is considered as a synonym of M. scutellatus (Say) var. oregonensis Lec. which Essig describes in his book.

All of which suggests that a reviewer should keep up to date on his subject. Look 'em up "H.R.F."; Look 'em up!

F.P. Keen

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### THE MOST ANCIENT MODERN BEETLE.

In the collection of the California Academy of Sciences there are several specimens of the wood boring beetle, Trachykele opulenta Fall., which were taken from a 1200 year old lightning scar in the wood of a "Big Tree" Sequoia washingtoniana. These specimens were collected at Giant Forest, Sequoia National Park, Calif., by Dr. E.P. Van Duzee. When the tree was about 421 years old it was struck by lightning. Trachykele attacked the scar and a brood of beetles developed in the wood. Some of these failed to emerge and were hermetically sealed as the new growth covered the scar. There they remained for 1200 years in perfect condition until discovered by the inquiring entomologist.

A careful comparison of these ancient specimens with modern specimens of the same species reveals the fact that there has been no appreciable change in the species during the 1200 years. Can we say the same of the entomologist?

H.E. Burke.

## BEETLE LOSSES IN YELLOW PINE IN OREGON.

Beetle loss figures are now available for a six-year period in a large yellow pine stand in Klamath and Lake Counties in southern Oregon. This timber is outside of the boundaries of the famous Southern Oregon-Northern California pine beetle control project. Nearly all of the beetle damage was caused by the western pine beetle (D. brevicornis). The mountain pine beetle (D. monticolae) and various Ips species are involved to a minor degree. During this six-year period (1921-1926 inc.) for which figures are available no control work was done. The data were secured as a result of five annual surveys in the late fall.

The more important statistical data are as follows:-

### Acreage and Volume (Yellow Pine)

1,850,000 acres  
17,390,000 board feet,  
9.5 M. per acre - average yellow pine stand.

### Beetle Losses.

1921	40,000 M. board feet	0.23	of 1%	of total stand.
1922	40,500 M. board feet	0.23	" " " "	" "
1923	50,000 M. board feet	0.28	" " " "	" "
1924	80,000 M. board feet	0.46	" " " "	" "
1925	71,000 M. board feet	0.40	" " " "	" "
1926	70,000 M. board feet	0.45	" " " "	" "

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Average 60,000 M. board feet 0.34 " " " " "

The above figures include both the epidemic and endemic losses. For the six-year period, the epidemic losses averaged 1.17 per cent per year of the yellow pine stand involved in the epidemics. During the same period, the average annual endemic loss amounted to 0.28 of one percent of the yellow pine stand included in the endemic areas.

In 1921 and 1922 there were no epidemic areas of noteworthy size. During the four-year period 1923-1926 inclusive, an annual average of slightly over two billion board feet or less than 12 per cent of the total yellow pine volume suffered from epidemic beetle activity.

A.J.Jaenicke.

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### WESTERN PINE BEETLE NEAR MT. HAMILTON.

"Wherever you find the pine you will find the beetle" might be adopted as an axiom. So far we have failed to find any areas of distinct yellow pine type in California that does not contain at least a few trees that have been killed by the western pine beetle.

Just south of Mt. Hamilton is a small area of yellow and Coulter pine that is effectively isolated from any timber of similar type. For the past two seasons from 8 to 15 trees have been killed on the area by D.b. This fall a powerline was cut through the timber and the logs which were left along the right of way trapped part of the beetle population so that the number of overwintering broods in standing trees is less than usual. Apparently these isolated colonies of beetles run true to form.

J.M.Miller



### THE KAIBAB BUG EPIDEMIC IS OVER

"Not enough insects to Justify the continuation of experiments and studies." This note in a recent letter of the Bureau of Entomology <sup>8705</sup> made the story of the Kaibab epidemic of Black Hills beetle (Dendroctonus ponderosae Hopk.) The epidemic started about 1920, reached its peak in 1923 and 1924, broke in 1925, and disappeared in 1926. It killed many millions of feet of standing timber, cost the United States more than \$75,000 to fight, and gave the best opportunities of recent years for studying the insect under epidemic conditions and for conducting large scale experiments in control methods.

The western yellow pine timber on the Kaibab Plateau of Arizona is isolated. To the south the Grand Canyon is a 13-mile-wide gash in the earth's crust. On the west, east, and north, the surrounding country is treeless for many miles. The billion feet of more of timber on the plateau is virgin forest, practically inaccessible because so far from railroads. When the epidemic of Black Hills beetle broke out the scientists of the Bureau of Entomology regarded it as a not unmixed evil, for here was the best chance to study the bug since the Black Hills epidemic of 1905-1912. The isolation of the timber body at least reduced the number of possible complicating factors.

Now they tell us that this epidemic of 1920-1925 was merely the latest of many epidemics that have occurred on the Kaibab from time to time. Through past decades and centuries the bugs have killed off the old timber, making room for the reproduction to grow but never, of themselves, wiping out the forest.

Man's part in this latest epidemic? The Forest Service spent over \$60,000 killing the bugs by cutting infested trees and peeling or burning the bark. The Park Service did the same thing on the smaller timbered areas in the Grand Canyon National Park. The Bureau of Entomology told both services what to do, and helped do it. There was not enough money available in any year to do all that should have been done, but literally millions of bugs were killed each year in which control work was done.

Man did not break this epidemic, so far as can be determined now, but he helped. The epidemic developed its own destruction, and the killing by man was like Saul's thousands compared with David's tens of thousands. A dead bug, like a dead Philistine, gives no more trouble. On the Kaibab predacious insects multiplied and grew fat. Also after the first few years the flat-headed borers multiplied even faster than the Dendroctonus beetles and developed the charming habit of eating out the cambium of attacked trees ahead of the Dendroctonus larvae, so that said larvae starved. The balance of nature was asserting itself. Man hastened the consumation of nature's efforts. Now the epidemic is past. But a new one may start any time.

E. E. Carter, In Forest Worker.

### A SPECIAL PHOTOGRAPHIC DEVELOPER.

A photographic developer giving extreme contrast is sometimes a necessity in making negatives for special purposes. The formula given below has been used with fine results at the Stanford laboratory. This developer gives good contrast and density yet builds up fine detail without tending to extreme harshness. It is invaluable in copying charts and line drawings and in photographing cross sections of wood and increment cores. It works equally well with plates or films. The formula is:

Metol . . . . .	5 grains
Sodium Sulphite . . . . (Anhy)	$\frac{1}{2}$ oz.
Hydrochinon . . . . .	53 grains
Sodium Carbonate (Anhy) . . . .	$\frac{1}{2}$ oz.
Potass Bromide . . . . .	5 grains
Water . . . . .	10 ozs.

For tray development use undiluted. Time of development for line work is 4 minutes at 65 degrees F. For other work not requiring as great density develop for 3 minutes at 65 degrees F.

J.E. Patterson

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F.P. Keen, on February 24th, gave a talk at the weekly luncheon of the Los Gatos Kiwanians on the Control of Barkbeetles in the Kaibab Forest of Arizona. The talk was illustrated by the use of colored slides showing the general region and the methods of control. The talk aroused considerable interest and evoked a number of questions on the best methods to eradicate strawberry and celery pests.

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State Forester Pratt announced at the January 21st meeting of the Society of American Foresters that the new State budget for the biennium 1927-1929 provided \$20,000 for cooperation between the State Board of Forestry and the Federal government in forest research work.

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### GIVING THE BEETLES THE AIR.

From time to time at the Forest Insect Laboratory, Palo Alto, Calif., there is received from a lumber company or a timber owner, a sample of wood in one package and the insect which has been infesting the wood in another. This shipment usually is preceded by a letter stating the injurious effects of the insect to the lumber in the yard or to the trees in the woods. We patiently await the arrival of the devastating pest and its work so that we can intelligently enlighten the owner as to the best methods of control. The carefully packed specimens finally arrive - but there are no insects inside. The shipper has conceived the idea that to keep the insects alive until they reach the laboratory, it is necessary to punch holes in the metal cover of the shipping jar. The beetles, sometimes other insects, with almost human intelligence have decided to take advantage of the kind shipper who has "given them the air" and have escaped through cover, wrapper and all. Only another instance of good intentions gone wrong.

S.E. Bushey